Attachment 3. Work Plan

Background

This proposal describes an interregional planning effort focused on prioritizing and developing mercury remediation projects within the Sacramento River Watershed.

Each IRWM Region looks at mercury pollution issues through a lens appropriate to their respective geography. In some regions (such as the Upper Feather River) mercury has been a topic of concern for a relatively short amount of time, while groups in the Sierra Nevada Gold Country and Coast Range have been talking about with mercury for decades, and have clearer visions of where to focus their efforts. The broad range of capacity to understand and respond to mercury pollution demonstrates the need for interregional coordination and collaboration on mercury issues.

This project will update the Delta Tributaries Mercury Council's (DTMC's) 2002 "Strategic Plan for the Reduction of Mercury-related Risk in the Sacramento River Watershed" (Mercury Strategic Plan) specifically for use by Regional Water Management Groups (RWMGs) in the Sacramento River Watershed. It will synthesize the best available science and data to generate decision-support tools that a broad audience can use to better understand mercury pollution within the Sacramento River Watershed.

The overall objective of this proposal is to identify the best places to implement mercury remediation projects that reduce mercury delivery to the Sacramento-San Joaquin Delta (Delta).

Regional Water Management Groups

The Sacramento River Funding Area consists of nine RWMGs. Five of these groups, collectively representing most of the mercury load currently delivered to the Delta, express their commitment to this interregional proposal (in alphabetical order):

- American River Basin
- Cosumnes, American, Bear, Yuba (CABY)
- Northern Sacramento Valley
- Upper Feather River Watershed
- Westside-Sacramento (Yolo, Solano, Napa, Lake, Colusa)

Each of these RWMGs has been approved through the Regional Acceptance Process (RAP) and reference this interregional proposal in their individual proposals.

The lead applicant for this interregional planning grant is the Sacramento River Watershed Program (SRWP). The SRWP was founded in 1996 and certified as a California not-for-profit corporation with 501(c)(3) status in 2003. The SRWP's Executive Director is authorized to receive and disburse funds and is capable and committed to ensure that this project will be completed.

Sacramento River Watershed Region

The interregional planning region includes the entirety of the area encompassed within the five participating RWMGs (**Figure 1**). In general this is the watershed catchment area of the Sacramento River below Shasta Dam. Specifically, this is the area North of the Sacramento-San Joaquin Delta from the Sierra Crest to the Coast Range drainage divide, with the Northern boundary being the Shasta/Siskiyou County Line.

Figure 1. Sacramento Funding Area, with participating IRWM Regions shaded.

This planning project will benefit the entire Sacramento River Funding Area. Mercury occurs naturally within this watershed and enters waterways from soil erosion and geothermal springs. Cinnabar ore was mined in the Coast Ranges (*Westside-Sacramento*) and processed to obtain elemental mercury. This liquid form was transported to the Sierra Nevada *(CABY and Upper Feather River Watersheds)* where it was spread widely into waterways during gold mining activities. Contaminated mine sites and downstream waterways are a legacy source of mercury in the area. Other lesser sources within the watershed include: the atmosphere (from various emissions), urban runoff, and discharges of treated municipal and industrial wastewater.

Today, mercury contamination is concentrated towards the Southern end of the project area and foothills, associated with sources in legacy mining districts.

Many of the concerns about mercury pollution stem from the toxic affects of methylmercury to humans and wildlife. Exposure to methylmercury comes largely from eating fish and shellfish that have accumulated this toxic substance through the food chain. Methylmercury is linked to developmental problems in fetuses and children and to nervous system effects in adults. Similar effects have been seen in wildlife. Over 100 waterbodies throughout the Central Valley have unsafe levels of mercury in them (listed as impaired by the State), and new water bodies are added to this list faster than regulations to control mercury contamination can be developed.

Existing IRWM Plans

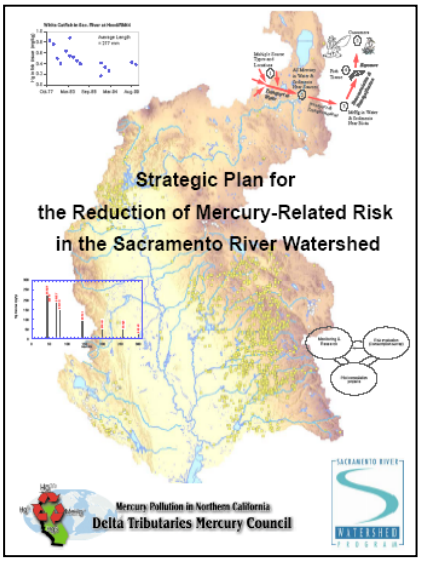
Each of the participating RWMGs has an existing plan, but many of them are in the process of updating their plans and hope to enhance their coordination with neighboring RWMGs during this update process (**Table 1**).

Table 1. Status of IRWM Plans for each Region.

Participating RWMG	Regional Water Management Group	Plan	Plan Status
American River Basin	Regional Water Authority	American River Basin IRWMP	Adopted June 2006, proposal to update
Cosumnes, American, Bear, Yuba	CABY Planning Committee	CABY IRWMP	Adopted in 2008; proposing to update
Northern Sacramento Valley	Northern Sacramento Valley	None	Proposing to update
Upper Feather River Watershed	Feather River	Upper Feather River IRWMP	Adopted in 2005; update in progress
Westside-Sacramento	Westside-Sacramento	Yolo County IRWMP; Solano Agencies IRWMP	Yolo adopted in 2007; Solano adopted in 2005

In June 2008, the CABY RWMG began to facilitate quarterly meetings of RWMG representatives in the Sacramento River Funding Area. This process included discussions on interregional project development, coordination, and funding. Mercury contamination was identified as an important interregional topic.

This interregional planning effort will update the Delta Tributaries Mercury Council's (DTMC's) 2002 "Strategic Plan for the Reduction of Mercury-related Risk in the Sacramento River Watershed" (Mercury Strategic Plan) specifically for use by RWMGs in the Sacramento River Watershed. Recommendations in the current Mercury Strategic Plan were based on compilation and synthesis of the best available information at that time on mercury behavior in the environment. The primary recommendations were:



- Identify appropriate areas for and types of pilot remediation projects,
- Develop a modeling framework for incorporating quantified relationships, assessing monitoring data, and improving predicative ability,
- Design and implement monitoring to assess local and regional effect of pilot projects and to support models,
- Design and perform research projects to improve models and coordinate with other ongoing research projects,
- Develop and implement an outreach program to collect additional fish consumption information and to inform and educate affected people regarding mercury risks in the short term, and
- Continuously plan and evaluate progress.

Supporting information was provided via an extensive list of references, and more detailed information and analyses in six appendices:

- Conceptual Model Report
- Mercury Targets Report

- Mercury Control Measures Report
- Mercury Models Report
- Decision-Support Tool Report
- DTMC Outreach Strategy Report Draft

For more information about the 2002 Mercury Strategic Plan or the DTMC, visit www.sacriver.org/issues/mercury/dtmc/.

Since 2002, Calfed has funded over $30 million in research on mercury science. Based in part on that knowledge, the Central Valley Regional Water Board has developed two seminal Total Maximum Daily Loads (TMDL) to address mercury impairments: one set in the Cache Creek Watershed (the Westside-Sacramento RWMG) and another set in the Sacramento-San Joaquin Delta. Yet today, 58 additional water bodies in the Sacramento River Watershed remain to be regulated under TMDLs.

The DTMC's 2002 "Strategic Plan for the Reduction of Mercury-related Risk in the Sacramento River Watershed" and the more recent body of research and experience constitute the starting point of a mercury-specific interregional plan, but the overall goal of this interregional planning effort is not to create a new IRWM Plan for the entire Sacramento River Watershed. Rather, the goals are to enhance mercury-related planning, decision-support tools, best management practices, and implementation projects in *each Region's* IRWM Plan.

The result will be the *Interregional Plan for Mercury in the Sacramento River Watershed* (Interregional Mercury Plan) as well as a section in each IRWM Plan's interregional coordination sections called *Mercury Strategies*.

Public Process

This proposal will leverage the work of the DTMC by engaging current members and providing financial support to a diverse set of stakeholders to participate in the process. Since 1999, the DTMC has been the open, organizational hub for science and policy information on mercury issues in the Delta and its tributaries. Participants include state, local and federal resource, health, and regulatory agencies; local watershed groups; industry representatives; government agency and university scientists; water agencies; municipal public works and planning staff; environmental consultants; environmental advocates; tribal representatives; and landowners. Primary forms of communication have included a web site, monthly newsletters, and an annual conference. The web-based listserv sends emails to 500 members and provides a no-hassle, public subscription process.

Facilitators over the past dozen years have consistently made efforts to engage potential new stakeholders. General meetings are typically held in the greater Sacramento area but are also available remotely via telephone and web conferencing. Special efforts are made to engage new stakeholders who are interested in specific topics on upcoming agenda. The facilitator frequently invites outside speakers who can share new knowledge with regular participants.

Disadvantaged Communities

Individual RWMGs maintain lists of the Disadvantaged Communities (DACs) in their regions (**Table 2**). The process used by each RWMG identifies DACs varies, and is described in each individual RWMG's proposal. DACs will be engaged in the planning process, and provided with access to the knowledge and information generated by this planning process through outreach at public libraries, and through a funded representative that attends quarterly DTMC meetings and travels to each DAC in the project area.

Table 2. Disadvantaged Communities (DACs) identified in each participating RWMG

Participating IRWM DACs	Population	Average Income
American River Basin		
No unique DAC communities. Based on 2000 census, ARB has 108 census tracts that fall below the average income level for determining a DAC.		
Cosumnes, American, Bear, Yuba		
Challenge-Brownsville	1069	$27,037
Colfax	1496	$37,391
Diamond Springs	4888	$36,449
Foresthill	1791	$34,348
Grass Valley	10922	$28,182
Nevada City	3001	$36,667
North Auburn	11847	$37,493
Penn Valley	1387	$35,962
Placerville	9610	$36,454
Plymouth	980	$37,262
Washington	140	$21,667
Northern Sacramento Valley		
DACs are identified only in maps in the Northern Sacramento Valley IRWM Planning grant application.		
Upper Feather River Watershed		
Johnsville CDP*	37	$6,042
Belden CDP	22	$6,719
Indian Falls CDP	22	$7,321
Tobin CDP	25	$11,250
Twain CDP	61	$16,071
Clio CDP	101	$23,036
Greenville CDP	1217	$23,309
Westwood CDP	1998	$24,148
Lake Almanor Peninsula CDP	378	$26,000
C-Road CDP	139	$26,250
Portola City	2251	$28,103
Iron Horse CDP	347	$30,208
Crescent Mills CDP	269	$30,268
Quincy CDP	1849	$30,508
La Porte CDP	40	$30,781
Blairsden CDP	70	$33,393
Chester CDP	2239	$33,413
Meadow Valley CDP	569	$33,571
Loyalton	874	$34,063
East Quincy CDP	2390	$35,648
Chilcoot-Vinton CDP	291	$35,938
Delleker CDP	662	$37,500
Westside-Sacramento		
Lakeport	7427	$34,182
Upper Lake	839	$25,301

Participating IRWM DACs	Population	Average Income
Nice	2539	$23,589
Lucerne	2770	$24,712
Glenhaven	407	$35,720
Clearlake Oaks	2543	$25,567
Spring Valley	1433	$36,329
Clearlake	13031	$19,946
Lower Lake	1389	$29,641
Middletown	1021	$36,575
Kelseyville	2390	$25,429
Other DACs are identified only in maps in the Westside-Sacramento IRWM Planning grant application.		

* Community Designated Place with less than 80% of California Median Household Income

DTMC participants include state health agency staff, local watershed groups, and environmental justice advocates. Appendix 6 of the existing Mercury Strategic Plan was the draft DTMC Outreach Strategy Report. That report's information was applied subsequently by CALFED's Delta Fish Mercury Project to survey subsistence fishing communities and to provide clear messages about safe fish consumption patterns. That recent experience in the Delta will prove useful for communicating with DACs in the Sacramento River Watershed.

Process Used to Identify the Regions' Water-related Objectives and Conflicts

Mercury-impaired water bodies that this plan will benefit are shown in **Figure 2** of the entire Central Valley.

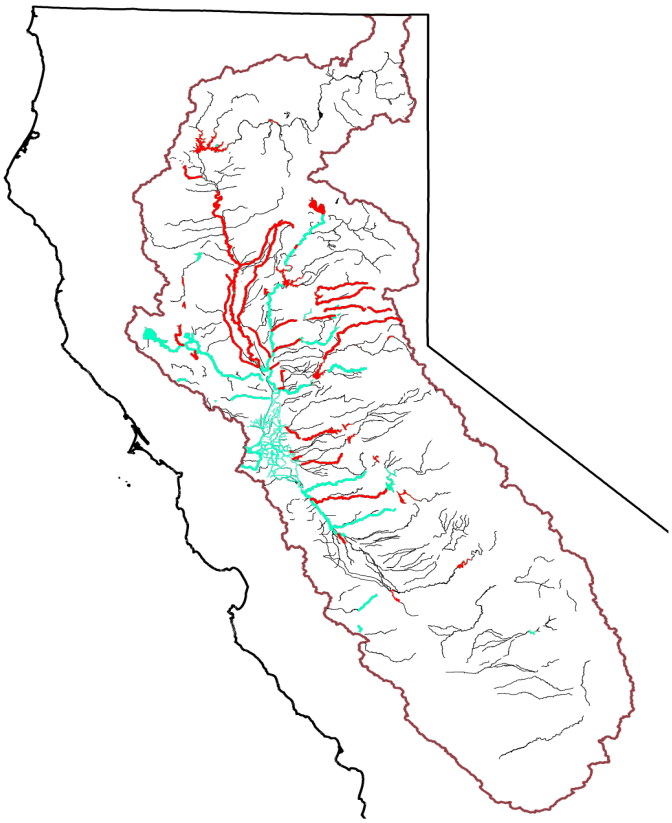


Figure 2. Map of mercury-impaired water bodies in the Central Valley. Light blue lines indicate mercury-impaired water bodies on the state's 2006 303(d) list; red lines are water bodies added to the 2010 list.

Based on the 2010 list, 62 waterbodies in the Sacramento River Watershed are impaired by mercury contamination (**Table 3**). This list of impaired waterbodies is reviewed and updated every two years through a public process. As more data are collected and assessed, invariably more water bodies will be added to this list. The US Environmental Protection Agency requires states to produce TMDLs for all 303(d) listed water bodies in the state by 2021.

Table 3. Water bodies in the Sacramento River Watershed listed as impaired by mercury.

Participating RWMGs	303(d) Listed Waterbodies for Mercury
American River Basin	American River, Lower (Nimbus Dam to confluence with Sacramento River)
	Folsom Lake
	Lake Natoma
	Natomas East Main Drainage Canal (aka Steelhead Creek, downstream of confluence with Arcade Creek)
Cosumnes, American, Bear, Yuba	American River, North Fork
	American River, South Fork (below Slab Creek Reservoir to Folsom Lake)
	Bear River, Lower (below Camp Far West Reservoir)
	Bear River, Upper (from Combie Lake to Camp Far West Reservoir, Nevada and Placer Counties)
	Camp Far West Reservoir
	Combie Resevoir
	Humbug Creek
	Yuba River, Middle Fork
	Yuba River, North Fork (including New Bullards Bar Reservoir)
	Yuba River, South Fork (Spaulding Reservoir to Englebright Reservoir)
	Little Deer Creek
	Rollins Reservoir
	Scotts Flat Reservoir
	Deer Creek (from Deer Creek Reservoir to Lake Wildwood, Nevada County)
	Englebright Lake
	Gold Run (Nevada County)
	Hell Hole Reservoir
	Oxbow Reservoir (Ralston Afterbay, El Dorado and Placer Counties)
	Slab Creek Reservoir (El Dorado County)
	Wildwood, Lake (Nevada County)
Northern Sacramento Valley	Colusa Basin Drain
	Hensley Lake
	Clear Creek (below Whiskeytown Lake, Shasta County)
	Feather River, Lower (Lake Oroville Dam to Confluence with Sacramento River)
	James Creek
	Lake Oroville
	Natomas Cross Canal (Sutter County)
	Sacramento River (Cottonwood Creek to Red Bluff)
	Sacramento River (Red Bluff to Knights Landing)
	Sacramento River (Knights Landing to the Delta)
	Stony Gorge Reservoir
	Sutter Bypass
	Butte Creek
	Thermalito Afterbay
Upper Feather River Watershed	Lake Almanor
	Feather River, North Fork (below Lake Almanor)
	Lake Oroville
Westside-Sacramento	Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)
	Davis Creek (downstream from Davis Creek Reservoir, Yolo County)
	Davis Creek (upstream from Davis Creek Reservoir, Yolo County)
	Davis Creek Reservoir
	Putah Creek (Solano Lake to Putah Creek Sinks; partly in Delta Waterways, northwestern portion)
	Lake Berryessa
	Clear Lake
	Indian Valley Reservoir (Lake County)
	Sulphur Creek (Colusa County)

The common objective for each participating IRWM is to address mercury sources and exposure appropriately for their region. Toward this end, this project will develop a common knowledge base across all regions, promoting consistent and coordinated planning approaches for mercury. The project will use the DTMC group as a vehicle to gather new and existing mercury data, use the accumulated knowledge of the group to filter, rank, and organize the complied information, and then deliver a synthesis of the most relevant and current information through web-based GIS mapping tools, targeted spatial modeling, and a written report.

Potential conflicts inherent in an interregional approach stem primarily from geographic differences: downstream water managers are asking upstream counterparts to reduce source loads; and Sierra Nevada and Coast Range water managers are conflicted over how to prioritize mercury mining vs. gold mining source types. Since many of these competing objectives and potential conflicts are spatial in nature, the DTMC will aggregate all available information into new GIS data layers, and use live GIS mapping to facilitate their meetings, requiring participants to place their issues and concerns into a proper spatial context. This will allow people with differing perspectives to benefit from a common set of facts – the best available data and physical geography of mercury pollution.

The mercury impaired water bodies in the participating RWMGs drain to the Delta. Pursuant to the Delta Methylmercury TMDL, this interregional planning effort for mercury will support the participating RWMGs to: (1) identify and prioritize promising locations for reducing mercury loads, (2) characterize management practices that influence mercury loads and identify control studies needed to improve such characterizations, and (3) develop a comprehensive plan for implementing projects that address mercury loads.

Process Used to Determine Criteria for Developing Regional Priorities

Regarding the State's list of impaired water bodies, each participating RWMG recognizes that mercury is a priority pollutant. This interregional planning project will develop a set of watershed-wide, map-based decision-support mapping tools that the DTMC group will use to focus priorities among participating RWMGs.

A decision-support tool serves the management, operations, and planning levels of an organization by applying a consistent set of decision rules to a combination of raw data, documents, and models. It allows everyone to access the key information, and identify optimal solutions based on the collective interpretation of it.

Our approach focuses on placing all of the new and existing mercury information into a spatial context, where it can be viewed in map form. These maps will be used to facilitate the dialogue of the DTMC group, share information with non-technical audiences, and to prioritize key areas for a more detailed modeling effort. Examples of information that our decision-support mapping tools will gather and present are:

- Inventories of existing mercury information (including legacy sources),
- Comparative or relational mercury data over time and or over geographic locations,
- Clustering of mercury sources and their proximity to mercury-impaired waterbodies,
- Hazard of methylation (based on wetlands and reservoir mapping),
- Land ownership, topographic position, and land use.
- Flow accumulation (what is downstream of known pollution sites).
- Debris dam locations where legacy mercury is likely to have accumulated (historic maps of Lower Feather and Sacramento River corridors)

Simply put, the spatially explicit decision-support tools will be used to develop a common knowledge base, facilitate discussion, and build consensus and understanding to prioritize actions over a broad geographical region.

Data and Technical Analysis Collected/Performed and How Those Data Are Managed

A large component of this interregional planning process will be to manage existing data, fill critical data gaps, and portray this information through the decision-support mapping tools. This process will be greatly accelerated due to the previous efforts of the DTMC and CALFED research. The DTMC has accumulated available data for stream flow rates and concentrations of total mercury, methylmercury, and total suspended solids. GIS layers showing historic mining sites, land uses, watershed boundaries, and stream segments, detailed soils mapping, and topography were also aggregated for analysis.

This project will also leverage the SRWP's Sacramento River Watershed Information Model (SWIM) project. SWIM is a suite of online mapping and document management tools developed for DWR to deliver watershed-related information to the public-at-large. The project will create a publicly accessible 'Mercury Catalog' that acts as a repository for current and future mercury-related information contributed by all participants and interested parties, and links users to mercury-related information via dynamic web-based maps. Data submitted to the Mercury Catalog will also be forward to the State Natural Resources Agency's 'California Environmental Information Catalog' (CEIC).

Interregional mercury meetings will be held quarterly at the offices of Larry Walker Associates in Davis, CA, Each meeting will consist of the general format of sharing new information and identifying IRWM Plan needs for mercury. Specific meeting tasks will include a GIS-facilitated review of the aggregated mercury information to develop priority areas The participating RWMGs will be represented by either and executive director or a delegated technical assistant for the region. RWMG representatives will be consistent throughout the process. The individuals or positions that will represent each RWMG are indicated in **Table 4**.

DTMC facilitator Dr. Stephen McCord will oversee the development of decision-support mapping tools and communicate progress of these efforts to the participating RWMGs. The map-based facilitation process will employ the SWIM's Digital Atlas (which features over 200 layers of GIS information for the Sacramento River Watershed). Interactive map-based planning meetings with the DTMC group will use the SWIM digital atlas to facilitate the collaborative process of prioritize regions of the Sacramento River Watershed most amenable to certain mercury remediation projects. These areas will then be analyzed in more comprehensive flow-modeling, mercury transport and transformation simulation modeling efforts.

Zeke Lunder and NorthTree GIS (co-developers of the SWIM project) will provide the GIS and web programming expertise to the project, running the SWIM GIS mapping tools in support of the DTMC quarterly meetings, and adding the Mercury Catalog tools to the existing SWIM website.

Table 4. Representatives from each participating RWMG in the Interregional Mercury Plan project.

Participating RWMG	Representative (Name, Title, Affiliation)	Qualifications
American River Basin	Lysa Voight, Senior Civil Engineer, Sacramento Regional County Sanitation District	Leads the District's mercury-related policy and planning projects for Regulatory and Legislative Affairs; active DTMC participant; stakeholder in Delta Mercury TMDL
Cosumnes, American, Bear, Yuba	Dr. Carrie Monohan, Science Director, The Sierra Fund	Member of CABY planning committee, coordinating committee, and Board; consulting scientist to Nevada Irrigation District's Combie Reservoir Sediment and Mercury Removal project
Northern Sacramento Valley	To be determined	
Upper Feather River Watershed	Leah Wills, Water Resources Consultant, Plumas County	Over 20 years experience with Plumas County and Butte County in water and natural resources management; extensive experience with water quality, watershed restoration, environmental justice, and tribal coordination.
Westside-Sacramento	To be determined	

How Integrated Resource Management Strategies Will Be Employed

This plan is consistent with existing Resource Management Strategies (RMS) and the Goals, Objectives and Strategies in the participating IRWM Plans.

Participating RWMGs will be responsible for implementing their IRWM Plans. Each plan will have a comprehensive, consistent and coordinated section on mercury response planning, practices and projects as a result of this interregional planning effort.

By giving each RWMG new maps, decision-support tools, and data to better visualize the scale and extent of mercury pollution within their regions, this project will enable participants to better engage ALL resource managers and planners in big-picture discussions about mercury issues. This project will also create a 'BMP Toolbox' that will identify and describe management practices that can be incorporated into implementation projects to address mercury concerns.

How the IRWM Plan Will Be Implemented and What Impacts and Benefits Are Expected

This interregional planning project will not create a new RWMG, but it will create a new *Interregional Plan for Mercury in the Sacramento River Watershed* (Interregional Mercury Plan). The Interregional Mercury Plan will include a section for each of the five participating RWMGs summarizing the 'Mercury Strategies' that each Region may elect to employ.

The interregional planning process will enable a progressive implementation strategy that depends on the current status and maturity of participating RWMGs. The goal is to develop an appropriate implementation strategy for mercury for each participating IRWM Plan. For example, a newer IRWM Plan may include mercury risk reduction as a goal, while a more mature IRWM Planning regions such as CABY's would benefit from more sophisticated support to mitigate mercury risk in implementation projects. Projects that reduce mercury contamination, and/or methylation would be encouraged for each of the participating RWMGs The capacity to fully develop these projects would be available through the DTMC group as well as from other partnering RWMGs and their representatives. The decision-support mapping tools and 'BMP Toolkit' will provide a technical basis for prioritizing implementation projects locally and regionally. The collaborative planning process will ensure that any such projects are well coordinated and consistent with best available science.

How Existing Plans Meets Current IRWM Plan Standards

As a collaborative, multi-stakeholder plan, the "*Strategic Plan for the Reduction of Mercury-related Risk in the Sacramento River Watershed*" created by the DTMC meets IRWM Plan standards. By providing the material to enable consistent strategy and application throughout the Sacramento River Watershed, and fostering integrated regional solutions that affect the local and regional environment, the Interregional Mercury Plan will enable each RWMG to meet plan standards related to Stakeholder Support, Data Management, Outreach to Disadvantaged Communities, Coordination, Integration, Objectives, Resource Management Strategies, Performance Measures and Monitoring. The *Interregional Plan for Mercury in the Sacramento River Watershed* will meet IRWM Plan standards because of the process by which it was created but also because, as an interregional plan, it primarily coordinates multiple existing RWMGs.

Work Plan

Specific work plan tasks that will be performed as part of the proposal are described in this section. These tasks are consistent with the budget (Att. 4) and schedule (Att. 5). The project team will conduct technical analyses including: applying Geographic Information System (GIS) maps and tools, synthesizing key research and project reports; drafting, publishing and presenting documents for stakeholder input; and promoting the use of the plan to guide regional policies and regulations, watershed improvement projects, and watershed monitoring.

Task 1. Manage and Administer Project

Provide administrative services needed for project completion: monitor, supervise, and review all work performed; coordinate budgeting and scheduling to assure that the Project is completed within budget, on schedule, and in accordance with approved procedures, applicable laws, and regulations; and account for all project-related expenses and match contributions. The Sacramento River Watershed Program's Executive Director, Mary Lee Knecht, will lead this task, coordinating with RWMG representatives and contractors supporting this project. A partial funding match from the Sacramento Regional County Sanitation District for developing a Sacramento River Watershed water quality brochure is included.

***Deliverables**: (1a) Regular invoices; (1b) quarterly project reports.*

Task 2. Engage Interregional Stakeholders

This project will provide mechanisms for communication and coordination among participating RWMGs as well as with other DTMC participants. This Interregional Mercury Plan process is designed to be broadly inclusionary among RWMGs and among different types of communities. The DTMC traditionally meets approximately quarterly. These meetings are announced through the DTMC listserv (over 450 recipients) and are available remotely via phone and web conferencing.

Dr. Stephen McCord has been facilitating and/or providing technical consulting services to the DTMC for the past 10 years. Dr. McCord will facilitate approximately quarterly meetings dedicated specifically to interregional planning for mercury with participating RWMGs, and additional quarterly meetings for the broader DTMC stakeholder group. Facilitation activities and other project team members are described here.

- **Develop and maintain an Interregional Mercury Plan listserv.** The listserv will be filled initially with contact information for RWMG representatives and DTMC members. Any interested party may join the web-based list to receive the same communications.
- **Facilitate Interregional Mercury Plan Workgroup.** Host quarterly meetings at the offices of Larry Walker Associates in Davis, CA, and provide web-based access and teleconferencing options. Depending on stakeholder input needs and current issues, facilitate additional on-line meetings using web conferencing and teleconference technologies. Project staff will also be used to run the SWIM online GIS mapping tool for map-based facilitation during meetings.
- **Support the participation of RWMG representatives.** In-kind cost sharing ($10,000 per RWMG) will apply to the time spent on this effort. In addition, at least one member of Sacramento River Watershed Program's Board of Directors will participate at the same level of in-kind support.
- **Facilitate inclusion of Disadvantaged Communities (DACs)** with the goal of improving their knowledge and involvement in mercury management issues at the IRWM Region scale. Mike Thornton, Mining Project Community Organizer for The Sierra Fund will lead this effort by going to every DAC community in the Sierra and talking with them about the Interregional Planning effort around mercury. The Sierra Fund has been conducting a highly successful outreach Initiative throughout the Sierra Nevada since 2006, and has already made key contacts in all 22 counties of the region. This outreach aims to engage and inform communities that are

otherwise left out of the planning process. Activities will include circuit riding, and providing community members with pathways for input. For this project, Mr. Thornton will work with organizations within DACs to improve their involvement in interregional mercury planning at stakeholder meetings, including project development assistance. For example DAC communities may require assistance in developing projects to improve water quality by upgrading water treatment facilities or other existing infrastructure. This effort will have three primary benefits to the project because it reduces mercury loading at point sources, engages rural communities by reaching out to them, and benefits the RWMGs because it helps them with their process of DAC inclusion.

- **Support inclusion of the California Indian Environmental Alliance (CIEA)** to participate in Interregional Mercury Plan meetings, to identify tribal representatives in each IRWM Region, to summarize preferred communication methods between tribes and RWMGs, and to conduct outreach to include participation of California Indian Tribes and tribal members in the IRWM planning effort. CIEA has worked with tribes regionally to hold mercury strategic planning roundtables and to increase tribal participation in regional activities that regulate, reduce and address mercury. Tribes in the Cache Creek and Feather River watersheds have actively expressed interest addressing mercury contamination and their environmental departments have experience in management of similar projects CIEA will work with each RWMG to insure direct notification, outreach and consultation occurs to involve tribes directly.
- **Support the involvement of environmental advocate Tuleyome (a non-government organization).** Tuleyome will participate in project planning meetings; and lead outreach to other conservation organizations (e.g., Yolo Audubon Society, Sierra Club, California Native Plant Society, Planning and Conservation League, and myriad smaller groups), public land agencies (particularly the Bureau of Land Management), and affected private landowners. The long-term support of these organizations can be an integral part of drawing attention to this issue in the region and helping to work for funding for abandoned mine and toxic mercury cleanup. Tuleyome participated in the development of the Delta Methylmercury TMDL and interacts with the BLM on an ongoing basis with respect to the upper watershed and Westside mercury issues. Bob Schneider is the key personnel working on Tuleyome's Abandoned Mine and Toxic Mercury Clean Up program. He has a BS degree from UC Davis and served five years as Chair of the Central Valley Regional Water Quality Control Board during which time the Clear Lake, Cache Creek and Sulphur Creek TMDLs were adopted.
- **Provide communication link between Interregional Mercury Plan Workgroup and DTMC.** Solicit feedback to the Interregional Mercury Plan Workgroup from the broader DTMC constituency and regularly invite participation in Workgroup activities. External funding of $28,000 by the Sacramento Regional County Sanitation District in 2008-2009 for facilitation of the Delta Tributary Mercury Council is being applied as cost sharing.

***Deliverables**: (2a) Interregional Mercury Plan Workgroup listserv; (2b) Interregional Mercury Plan Workgroup meeting notes; (2c) DTMC meeting notes. Output from these subtasks will also be incorporated into the Interregional Mercury Plan (Task 7).*

Task 3. Outreach to RWMGs and Other Stakeholders

While RWMG representatives will be the primary conduit from the Interregional Mercury Plan Workgroup to their RWMGs, this task will provide (1) technical support on how to apply the Plan and decision-support tools, and (2) outreach to other stakeholders in the Sacramento River Watershed. Specific subtasks will include:

- **Develop a presentation and fact sheet summarizing the Interregional Mercury Plan.** These materials will focus on key recommendations and links to individual IRWM Plans. RWMG representatives on the Interregional Mercury Plan Workgroup will make these presentations.

- **Host a session of the Sacramento River Watershed Forum.** Invite IRWM decision-makers to interact with the project team and other interested parties to discuss priorities that balance costs and benefits for implementation project opportunities.
- **Develop and distribute kiosk training materials and web-based training videos about the SWIM Mercury Catalog and online mercury decision-support mapping tools.** These materials will be delivered to approximately 70 public libraries throughout the project area for posting at publicly accessible web terminals.

***Deliverables**: (3a) Interregional Mercury Plan presentation and fact sheet; (3b) Sacramento River Watershed Forum session; (3c) SWIM kiosk materials for approximately 70 public libraries.*

Task 4. Develop Web-based GIS Tools

The Interregional Mercury Strategic Plan will leverage the SRWP's SWIM online watershed GIS and document library, creating a new Mercury Catalog project that presents the project's decision-support mapping tools on the SWIM mapping website. These tools will allow users to visualize mercury pollution spatially, overlay different GIS layers on mercury maps, highlight priority areas, print paper maps, submit mapping of their group's proposed mercury projects, and view remediation projects proposed by other RWMGs.

The project team will develop protocols and assist in the transfer of contributed mercury-related documents, data, and GIS information into the SWIM Catalog. The data transfer protocols will establish methods for naming, organizing, attributing, establishing distribution permissions, and transferring files to SWIM. SRWP will develop a spreadsheet template that contributing RWMGs can use to expedite the process of attributing and submitting their documents, and will provide technical support to groups needing assistance in uploading their documents or data.

NorthTree GIS will work with RWMG representatives to ensure that GIS data is properly projected and adequately documented. Where possible, GIS metadata will be compliant with current FGDC and state standards. GIS data will be integrated by SRWP into the SWIM Digital Atlas.

Specific subtasks will include:

- **Develop a new web portal.** The portal will be associated with the DTMC specifically for the Mercury Strategic Plan Workgroup. Draft and final documents, meeting notes and minutes, relevant geo-tagged documents, as well as reference material and web links to related sites will be available on the web site. This site will be integrated with the SWIM Mercury Catalog, described above.
- **Communicate with RWMGs and other stakeholders to submit and catalog relevant documents.** Gather and catalog all documents to be geo-tagged and searchable via the SWIM website. As SWIM acts as a portal to the Natural Resources Department's California Environmental Information Catalog, all contributed documents will be indexed in the Statewide archive [See example document catalog at http://tiny.cc/i1p3k].
- **Synthesize mercury-related GIS layers into new downloadable GIS layers and interactive map layers.** Migrate the existing SWIM mapping infrastructure from ArcIMS to ArcGIS Server, and develop a Mercury GIS data service that hosts mercury-related GIS data in a single, central repository for use by offsite GIS users via SWIM.
- **Create a Mercury Catalog mapping feature within the SWIM online GIS.** Users will be able to view mercury pollution in spatial context with over 200 other data layers including hydrology, geology, soils, ecotype, riparian vegetation, historic mines, EPA superfund and regulated sites, etc. [For example of existing SWIM mercury data, visit: http://tiny.cc/glwpx.]

Deliverables: *(4a) Interregional Mercury Plan web portal; (4b) Mercury-related GIS layers and metadata in SWIM; (4c) Mercury SWIM Digital Atlas feature.*

Task 5. Develop and Apply Decision-Support Tools

To target and prioritize mercury remediation projects, stakeholders throughout the Sacramento River Watershed need tools that synthesize existing mercury pollution information with current knowledge on how to remediate it.

This task will develop decision-support mapping tools adaptable for each IRWM Region's unique challenges. These tools will use GIS analysis tools to aggregate collected information on the scale and severity of mercury pollution across the watershed into visual images and printed maps. These maps will be used to facilitate the process of prioritizing mercury project areas and remediation projects for funding. The tools will apply a prioritization scheme at the Sacramento River Watershed scale to identify the most critical areas for remediation. More spatially explicit simulation modeling will be conducted for these high-priority areas. Dr. Stephen McCord will lead the stakeholder-driven process with support from other project team members, leveraging similar work conducted in 2002 for the DTMC's Mercury Strategic Plan.

Specific subtasks will include:

- **Review collected mercury data, organize by location, and develop prioritization criteria for watershed-scale prioritization process.** This process will evaluate purely physical geographic features including land use/land cover, soils and wetland mapping data, historic landuse, and other spatial data sources identified by the DTMC group to focus promising mercury Best Management Practices (BMPs) and Best Available Technologies (BATs) on areas in the Sacramento River Watershed most likely to have a high hazard of mercury methylation.
- **Apply the SWIM Mercury mapping feature as a decision-support tool.** This tool will display mercury pollution sources and currently impaired water bodies, highlighting areas of the watershed with high potential for mercury methylation from the task above. Show proposed mercury projects, and evaluate cultural factors including subsistence and recreational fishing use, population density, land ownership, and other data layers identified by the group. The Workgroup will then prioritize problem areas and rank potential future projects. The input data will be predominantly from Task 4.
- **Develop and apply a mercury transport and transformation simulation model.** This decision-support tool will quantify downstream effects of potential watershed mercury projects identified by the two subtasks above. The Watershed Analysis Risk Management Framework (WARMF) model, sanctioned by the US EPA, will be applied. To simulate mercury transport and transformations, it is necessary to simulate flow and water quality constituents that affect mercury including: temperature, suspended sediment, river and lakebed sediment, organic carbon, dissolved oxygen, and sulfate. All of these are already simulated and calibrated within the existing Sacramento Valley WARMF application, providing a foundation upon which to leverage mercury simulation.
- **Make model products available in the SWIM Mercury Catalog.** Inclusion in the Catalog, described in Task 4, fulfills the twin promises of good decision-support tools, that they are: (1) based on stakeholder interests and (2) transparent, allowing broad audiences to understand them.
- **Identify opportunities for public-private investments in pilot testing and scientific evaluation.** Promising BMPs and BATs for mercury reduction will be identified throughout the Sacramento River Watershed. The Regional Water Board is advocating for coordinated approaches because of the particular and compelling characteristics of mercury: highly toxic in some forms, widespread, and predominantly from legacy sources. Identify potential non-state funding sources by project characteristic and link to spatially explicit findings of the decision-support tools.

Deliverables: *(5a) GIS data layers from collaborative planning process; (5b) Mercury simulation model for prioritized watershed project; (5c) Planning layers and simulation outputs added to SWIM Mercury Catalog. Output from other subtasks will be incorporated into the Interregional Mercury Plan (Task 7).*

Task 6. Develop Mercury BMP Toolkit

A key constraint to mercury load reduction is in some cases the *absence* of documentation or, in other cases, *so much* documentation that cleanup activities are not systematic. In addition, the daunting NEPA/CEQA permitting process inhibits action. This task will consolidate information on management practices that can be applied to a wide variety of water management projects to address mercury contamination.

Key subtasks will include:

- **Characterize existing management practices that affect mercury transport, transformation, and bioaccumulation.** Develop a survey instrument to document land and water management practices. In particular, identify and characterize current work by the federal Bureau of Land Management and state Department of Conservation. Compile, analyze and interpret survey data for commonalities and discrepancies. Address potential negative and/or unintended consequences associated with implementation of BMPs.
- **Identify barriers and develop strategies to broaden application of Good Samaritan protections.** Landowners otherwise willing to conduct pilot projects are hindered by the lack of sufficient protection.
- **Ensure environmental compliance including addressing any California Environmental Quality Act (CEQA) obligations.** In the development of implementation projects, the environmental compliance of any proposed activities will be identified and whenever possible CEQA project descriptions and initial studies will be drafted for participating RWMGs that plan to implement such a project.
- **Produce a Mercury BMP Toolkit applicable to IRWM projects.** Compile information on unit costs and potential returns on remediation investment, where available. Provide project development support for participating RWMGs that want to implement projects to incorporate BMPs for mercury into existing projects.

Deliverables: *(6a) Mercury BMP Toolkit. Output from other subtask will be incorporated into the Interregional Mercury Plan (Task 7).*

Task 7. Develop Interregional Mercury Plan

This planning project will produce an Interregional Mercury Plan. The plan will build on the accumulation of knowledge about mercury that Delta Tributaries Mercury Council leaders and participants have developed over the last decade. Information in the 2002 Mercury Strategic Plan will be re-tooled to be directly applicable for individual IRWM Plans to reduce mercury risk and to comply with current and future regulations.

The Plan will be a useful planning and coordination tool for decision-makers at the Sacramento River Watershed scale, and for individual IRWMs acting locally. Specific to IRWM Plans, the Mercury Strategic Plan will provide the technical basis for identifying, quantifying, and evaluating best management practices (BMPs) for reducing mercury risk in each IRWM program area. In addition to the main report, attachments will likely include (pending stakeholder input):

- Conceptual and Numerical Models
- Mercury Control Measures
- Decision-Support Mapping Tools (a description of the tools and their development process; the tools will be hosted on the SRWP website within the SWIM project)
- Projects that reduce Mercury contamination, that are prioritized based on regional significance

Key subtasks will include:

- **Summarize relevant findings of recent studies, identifying key factors controlling mercury mobilization, transport, and methylation.** The project team will summarize local and national studies on mercury transport, transformation, bioaccumulation, and health effects. This knowledge base will be shared in planning meetings and provide a technical foundation to the decision-support tools (Task 5).
- **Quantify potential benefits (e.g., reduced mercury loads, reduced methylmercury production, reduced health risk) of mercury remediation projects.** This information will build off the simulation model results under Task 5.
- **Write draft Interregional Mercury Plan and address review comments.** Stakeholders will be solicited for review comments and such comments will be addressed.

Deliverable: *(7a) Interregional Mercury Plan.*

Task 8. Prepare Project Report

The project team will compile the task deliverables into a comprehensive project report. The main report will recount activities performed under each task and summarize associated deliverables. The primary attachment will be the Interregional Mercury Plan. Additional attachments such as meeting summaries and attachments to the Plan will be included.

The project team will be building the SWIM Mercury Catalog for documents and GIS data. Documents in the catalog will be linked to points in the GIS, and will have corresponding web pages on the SRWP's SWIM website. The final report will be converted into a fully digital format, as a set of web pages that link users directly into all of the project content.

Deliverable: *(8a) Comprehensive project report. [All attachments are listed as separate deliverables above.]; (8b) Web-based product of the plan delivered via SWIM.*